



The Mixture Rule Under the Resource Conservation and Recovery Act

BACKGROUND: Under the Resource Conservation and Recovery Act (RCRA), wastes may be classified as hazardous wastes or solid (non-hazardous) wastes. Each classification of wastes has its own applicable handling requirements. In accordance with the definition of hazardous waste under RCRA, waste mixtures containing a hazardous and solid waste component are hazardous wastes, unless certain exceptions apply. Also, when determining whether [Subpart CC air emission standards](#) and handling requirements are applicable, it may be necessary to calculate the average volatile organic (VO) concentration for each hazardous waste stream at its point of waste origination **prior to mixing**. The primary purpose of the RCRA waste mixture provisions are to ensure that the Subtitle C (hazardous waste) requirements are applied consistently to both hazardous wastes and waste mixtures. These provisions were intended to discourage the commingling of the hazardous wastes with non-hazardous solid wastes simply to avoid Subtitle C regulation.

STATUTE: Resource Conservation and Recovery Act

REGULATIONS: 40 CFR 148.1(d), 261.3, 264.1(f), 265.1084, 268.3, 268.41, and 268.44

REFERENCES:

1. "Obtaining Variances from the Treatment Standards of the RCRA Land Disposal Restrictions," EH-231 Guidance Manual, May 1990.
2. "Centralized Treatment Involving Dilution, Land Disposal Restrictions Third Third Scheduled Wastes," Final Rule, 55 FR 22666, June 1, 1990.
3. "RCRA Regulatory Status of Contaminated Groundwater EPA Memorandum," November 13, 1986.
4. "Applicability of Land Disposal Restrictions to RCRA and CERCLA Groundwater Treatment Reinjections," EH-231 Memorandum, March 28, 1990.
5. "Status of Personnel Protective Equipment as a RCRA Waste," EPA Memorandum, January 3, 1989.

What is a "Mixture"?

For the purposes of the "Mixture Rule," a mixture is any combination of a listed or characteristic hazardous waste and a non-hazardous solid waste.

What is a "hazardous waste" under RCRA?

The RCRA regulatory framework identifies those solid wastes that must be managed as hazardous wastes. A solid waste is hazardous if it is not excluded from the hazardous waste regulations, and

- ☐ it is listed in one of three lists developed by EPA and contained in the Code of Federal Regulations (CFR) at 40 CFR 261.31-33 (a listed waste) or
- ☐ it exhibits one or more of four characteristics identified at 40 CFR 261.21-24 -- "ignitability," "corrosivity," "reactivity," and "toxicity" (a characteristic waste).

Are mixtures regulated as hazardous wastes or non-hazardous solid wastes?

Mixtures of listed hazardous wastes and non-hazardous solid wastes are considered to be RCRA hazardous wastes [40 CFR 261.3(a)(2)(iv)]. Mixtures of a solid waste and a listed

hazardous waste that is listed solely because it exhibits one or more of the characteristics of hazardous waste are hazardous wastes unless the resultant mixture no longer exhibits those characteristics [40 CFR 261.3(a)(2)(iii)]. Mixtures of characteristic wastes and non-hazardous wastes are hazardous wastes only if the mixture exhibits a characteristic of a hazardous waste [40 CFR 261.3(b)(3)].

In cases where a mixture results in the waste no longer exhibiting a hazardous characteristic, is the mixing process itself regulated under RCRA

Provided the hazardous waste is not listed, or was listed solely because of its characteristic, the mixture is no longer a hazardous waste, but the mixing process would be regulated as a hazardous waste treatment process, unless the mixture occurs in a unit that specifically has been exempted from regulation (e.g., a totally enclosed treatment process or an elementary neutralization unit [40 CFR 264.1(f)(5) & (6)]).

Are there exceptions to the mixture rule?

Yes. Wastewaters containing certain listed hazardous wastes are not subject to the mixture rule, provided the wastewaters meet specific criteria. First, the mixture must consist of wastewater, the discharge of which is regulated

under the Clean Water Act (CWA). Second, the wastewater mixture must contain one of the following:

- ❑ **Spent Solvents** specified in 40 CFR 261.3(a)(2)(iv)(A) & (B), if these solvents are not principle waste streams and are discharged in small quantities into wastewater for treatment. The referenced regulations specifying these solvents also impose certain limitations on the amounts that may be discharged.
- ❑ **Heat Exchanger Bundle Cleaning Sludge** from the petroleum refining industry (EPA Hazardous Waste Code K050). There are no limitations on the amount of this waste that may be added to the waste stream [40 CFR 261.3(a)(2)(iv)(C)].
- ❑ **Discarded Commercial Chemical Products** listed in 40 CFR 261.33 arising from *de minimis* losses from manufacturing operations in which the materials are produced or used as raw materials. There are no numerical limits on the amounts of commercial chemical products that can be added to the waste stream [40 CFR 261.3(a)(2)(iv)(D)].
- ❑ **Wastewaters Resulting from Laboratory Operations** containing toxic (T) wastes listed in Subpart D of Part 261. Limits on discharge into treatment systems are specified in 40 CFR 261.3(a)(2)(iv)(E).

[This exclusion does not apply to sludges generated by wastewater treatment that contain listed and/or characteristic waste (40 CFR 261.4(a)(2))]

If the above exceptions do not apply to a waste, is it possible to petition for an exemption from regulation?

If the hazardous component of the mixture is a listed waste, it is possible to apply for a delisting petition under 40 CFR 260.20 and 260.22. Also, as stated above, if the waste was listed solely because it exhibits a characteristic, the mixture is not a hazardous waste if it no longer exhibits that characteristic [40 CFR 261.3(a)(2)(iii)].

How do the Land Disposal Restrictions treatment standards apply to mixtures?

If the waste mixture has two or more applicable treatment standards for its constituents, then the most stringent standard applies to the mixture [40 CFR 268.41(b)]. It should be noted, however, that the land disposal restrictions do allow for a variance from the treatment standards, provided a petitioner demonstrates that the waste cannot be treated to the level specified in the rule (40 CFR 268.44) (*see ref. 1*)

Do the Land Disposal Restrictions allow for dilution of wastes to meet treatment standards?

Dilution of wastes or waste treatment residues to achieve a treatment standard specified under the Land Disposal Restrictions, or to circumvent any of the prohibitions under the Land Disposal Restrictions, is prohibited. However, there are exceptions. Characteristic wastes, with the exception of wastes that are characteristic

due to toxicity, may be exempt from the dilution prohibition under certain circumstances. Specifically, if such wastes are treated in:

- ❑ a treatment system permitted pursuant to Sect. 402 of the CWA or
- ❑ a treatment system meeting the waste pretreatment requirements under Sect. 307 of the CWA.

Treatment of non-toxic characteristic wastes in such systems is permissible unless a treatment method has been identified under the Land Disposal Restrictions as a treatment standard, in which case, that standard would apply [40 CFR 268.3)]. Furthermore, wastes discharged into an underground injection well subject to Safe Drinking Water Act regulations, which do not exhibit a hazardous characteristic at the point of discharge, are not subject to the dilution prohibition [40 CFR 148.1(d)(1) & (2)].

Aggregation is a prohibited form of dilution if the wastes are not treated, or are treated inappropriately, or if the waste is diluted so that it can be delisted under the above referenced delisting petition procedures. Aggregation is permitted in circumstances where all restricted wastes are amenable to the same form of treatment, and the treatment meets Best Demonstrated Available Technology (BDAT) standards (*see ref. 2*).

If an environmental medium such as soil or groundwater becomes contaminated (i.e., mixed) with a hazardous waste, is the contaminated medium subject to regulation as a hazardous waste?

By definition, contaminated media (soil, groundwater, and sediments) cannot be “mixtures” subject to the mixture rule. However, in accordance with EPA’s “contained-in” policy, such environmental media contaminated with hazardous wastes are regulated as hazardous wastes until such time as the medium is treated to remove the contaminant (*see ref. 3*). This EPA policy, which is not codified into regulation, is based on the premise that hazardous wastes mixed with environmental media do not lose their hazardous properties. This policy also results in the potential applicability of the Land Disposal Restrictions to contaminated media during environmental restoration activities (*see ref. 4*). It is important to note that in addition to environmental media, this policy extends to debris such as clothing and equipment that are contaminated with hazardous wastes (*see ref. 5*).

Questions of policy or questions requiring policy decisions will not be dealt with in EH-413 Information Briefs unless that policy has already been established through appropriate documentation. Please refer any questions concerning the subject material covered in this Information Brief to the RCRA/CERCLA Division, EH-413, (202) 586-6374.